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A HRSEM morphometrical study on the secretory response of human submandibular serous cells treated *in vitro* by pentagastrin

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In human submandibular glands, saliva production is principally regulated by parasympathetic and sympathetic nerves. Recently, however, Aras & Ekström (2006) and Loy et al. (2008) demonstrated, in rats and human parotid glands respectively, that secretion of parotid glands is induced by gastrointestinal hormones as well. Aim of this work is to study, in human submandibular serous cells, the morphological changes due to the gastrin-analogue pentagastrin with our *in vitro* technique, and to compare the results with findings obtained in response to autonomic receptors stimulation, as isoproterenol, a β -adrenergic agonist that induces a proteic secretion with little fluid, and carbachol, the pan-muscarinic receptors agonist that stimulates an abundant fluid saliva.

Samples of normal human submandibular glands, obtained at surgery, were stimulated in an oxygenated inorganic medium both with pentagastrin and with other secretagogue drugs. Specimens incubated in the same medium without the drugs served as controls. Samples were then processed for light (LM) and high resolution scanning electron microscopy (HRSEM) according to our modification of the OsO₄ maceration method (Riva et al., 1998).

After pentagastrin treatment, serous acini show, by LM, a few dilated intercellular canaliculi with sign of exocytosis, while cells are full of secretory granules. To quantify the response we have measured, in HRSEM images, the density of the sign of exocytosis (protrusions), that of microvilli and that of microbuds located in 1 μ m² of the cytoplasmic surface of the canaliculi luminal membrane, exposed after removal of cellular organelles. Pentagastrin induced a significative reduction of microvilli and an increase of protrusions and microbuds with respect to controls. Since as results from our previous works, these findings are indicative of a secretory stimulation, we conclude that they demonstrate the activity of pentagastrin on salivary secretion. Moreover the fact that no large vacuoles are present, whereas a large number of microbuds possibly related to microexocytosis are seen, suggests that pentagastrin provokes a protein secretion with little fluid.

References

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Key words

Submandibular glands, pentagastrin, HRSEM, osmium maceration method, canaliculi